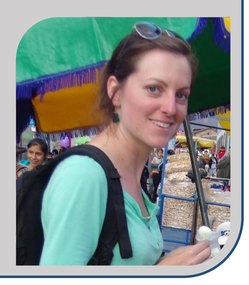
# *Sciaenops ocellatus:* Daily and seasonal sound variation during spawning in aquaculture.



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## *Sciaenops ocellatus*: the red "drums"

The red drum, males of the sciaenid ***Sciaenops ocellatus*** make sounds during reproduction. Since the 80's, this species is farmed in aquaculture for research and commercial purposes.

## Sound recordings in captivity

Fish sounds were recorded at the Research and Aquaculture station of Ifremer (Martinique) during an artificial reproductive period (summer 2015) with a Digital Spectrogram Long-Term Acoustic Recorder (DSG). Hydrophones were placed in 3 tanks. The first housed a group of fishes (N♂=12, N♀=8 ) and the other each had 1 ♂ / ♀ couple. A period of 1 min 30 has been recorded every 30 minutes during 3 months for the group, and 19 and 11 days for each couple.

## Objectives:

**1) Characterize the sound production in *S. ocellatus* during a spawning season in aquaculture**

**2) Understand the role of sounds in the reproduction.**

## Sounds are mainly produced at night

Sound production shows a **day/night cycle**. Calls occurred from 18:00 to 1:00, with a peak at between 21:30 and 23:00. Spawning always occur during this acoustic activity.

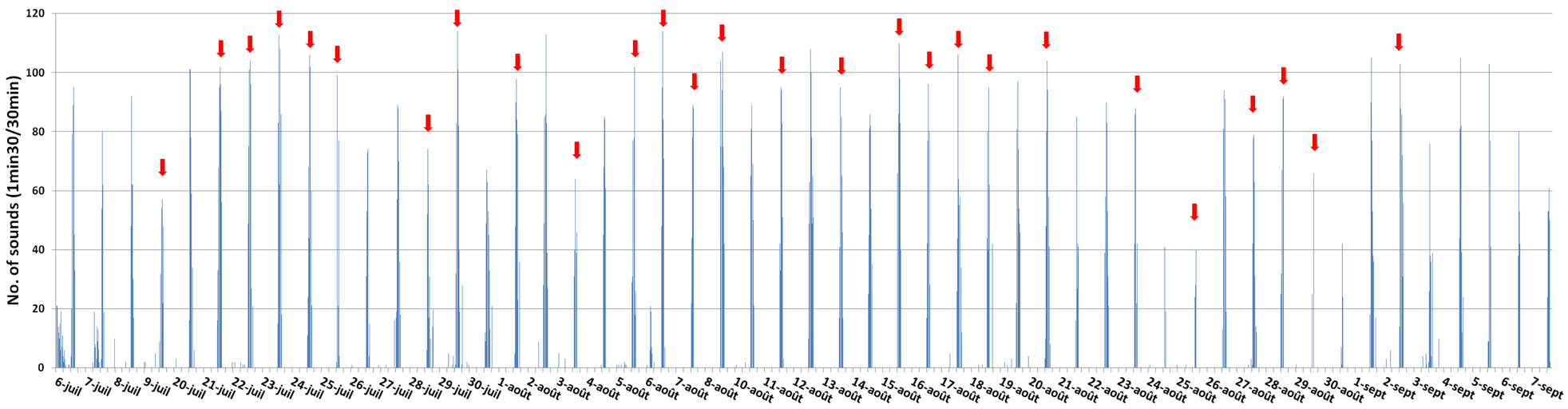


**Figure 1 –** Calling activity of the group of *Sciaenops ocellatus*, N♂=12, N♀=8 (July 6th to September 7th). Spawning events are shown by red arrows.

## Spawns occur before or after the calls peak

Spawns started between 21:55 and 23:55 in the group. But the number of sounds produced per time unit cannot be considered as a reliable characteristic to predict the time of eggs laying (fig. 2). Same results were obtained for the two couples.

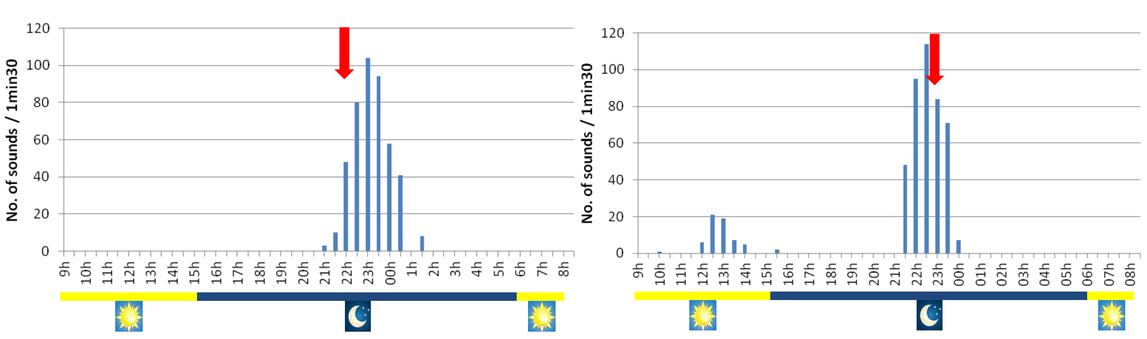


**Figure 2 –** Calling periods in the group of *Sciaenops ocellatus* during two nights, with time of spawn.

## Night calls are longer than day calls

Calls are composed of 1 to 20 pulses (fig. 3). During the night, the ratio of sounds containing more than 7 pulses is significantly higher than sounds containing less than 7 pulses. During the day, the opposite phenomenon is observed (p<0,0001).

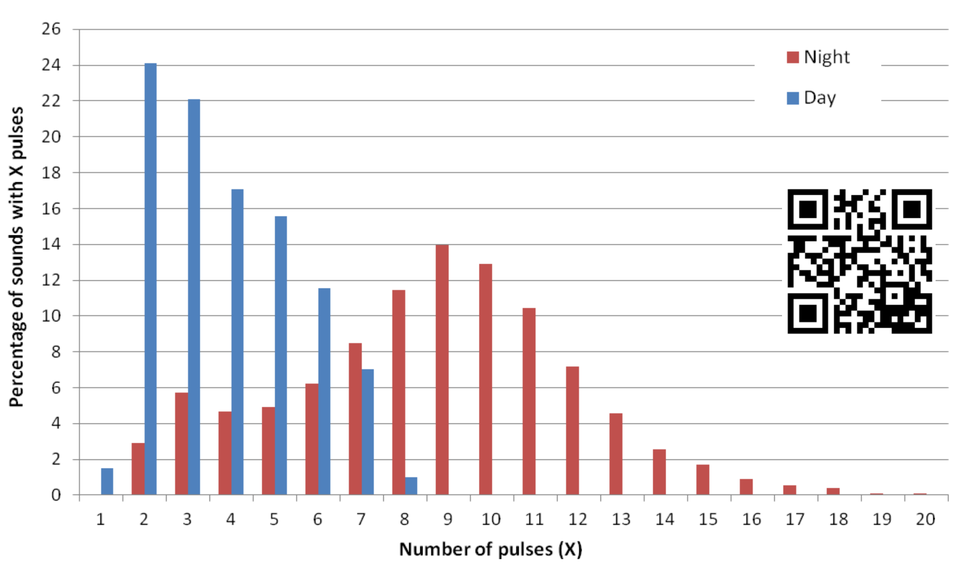


**Figure 3 –** Percentage of sounds with X pulses in the group of *Sciaenops ocellatus*, during night and day (July 6th to September 7th). QR codes: two sounds composed of 12 pulses

## Longer sounds are produced during spawning nights

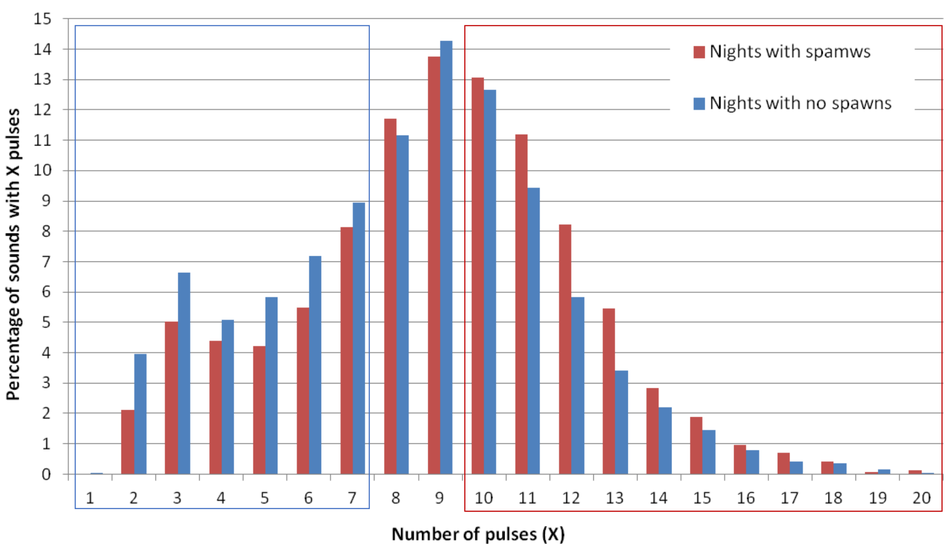


**Figure 4 –** Percentage of sounds with X pulses per night in the group of *Sciaenops ocellatus*, considering whether a spawn occurred or not.

The mean number of pulses per call is significantly higher during spawning nights (p<0,0001). The number of calls having 10 pulses or more was higher. Conversely, other nights showed a higher ratio calls containing less than 8 pulses.

## Conclusion

**The study highlights that the acoustic activity follows a circadian cycle.**

**Sound production is always linked to spawning, but cannot predict the time of egg laying.**

**Spawning nights can be associated with a higher proportion of longer sounds.**

**Sounds could be used as a male-female attraction during reproduction.**

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